

A Nanodroplet Processor for Advanced Microencapsulated Drug Formulations, Phase I

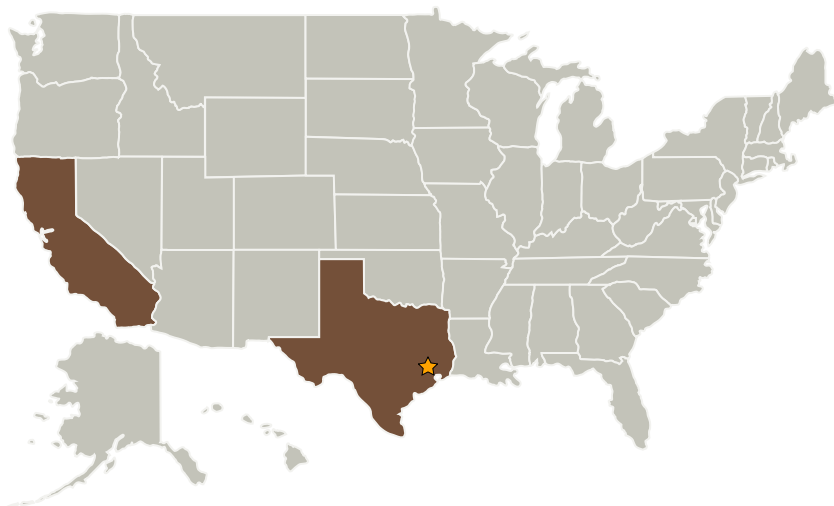
Completed Technology Project (2005 - 2005)



Project Introduction

The objective of this proposal is to provide a demonstration of a nanodroplet synthesis of multifunctional liposomes for drug delivery based on immiscible microfluidics processing. In this initial study, the functionality of the liposomes will include (1) the surface functionalized particles for targeting specific cells and (2) the protected packaging of protein therapeutics that may be released upon specific binding of the liposome to a targeted cell. This goal will be accomplished using nanodroplet technology that exploits the properties of immiscible fluids to transform continuous fluid streams into highly monodispersed, isolated droplets with tight control of droplet size and generation rate. The nanoparticles are formed at room temperature with low pressure and shear forces to prevent the denaturation of protein drugs, which will be important for the treatment of major diseases such as heart disease and cancer. Since cells rapidly uptake nanoparticles with sizes less than 500 nm, the major objective for this proposal is demonstrate highly monodisperse particles in this regime. Furthermore, we anticipate that producing such particles in a microgravity environment will lead to an improved fundamental understanding of droplet formation itself and to the production of homogeneously distributed therapeutics in a perfectly spherical nano-particle.

Primary U.S. Work Locations and Key Partners



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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Johnson Space Center (JSC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
★ Johnson Space Center(JSC)	Lead Organization	NASA Center	Houston, Texas
Nanotrope, Inc.	Supporting Organization	Industry	Cardiff, California

Primary U.S. Work Locations

California	Texas
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Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

Donald Ackley

Technology Areas

Primary:

- TX06 Human Health, Life Support, and Habitation Systems
 - └ TX06.3 Human Health and Performance
 - └ TX06.3.2 Prevention and Countermeasures